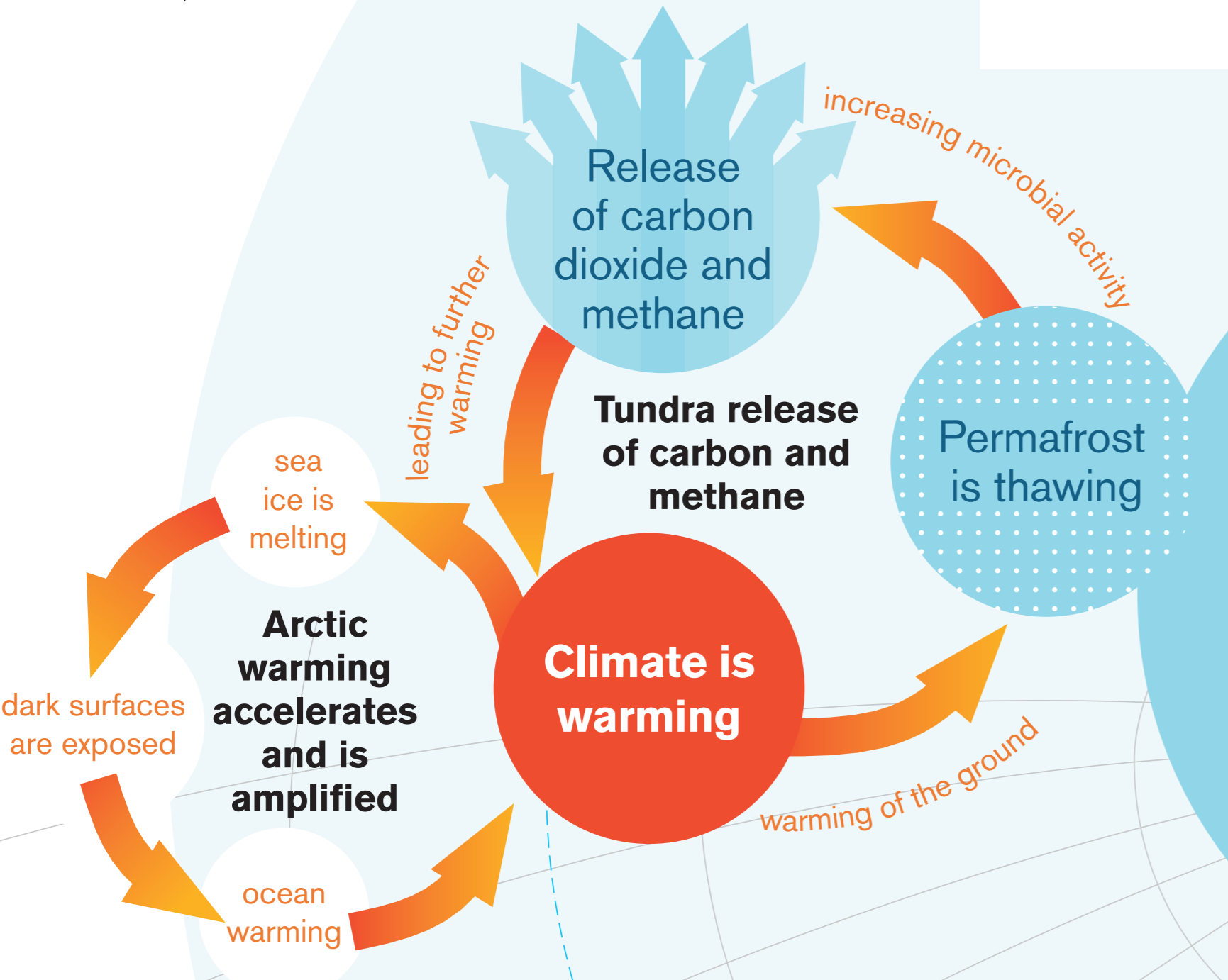




Climate Change and the Russian Arctic



Changes in snowfall

Since the mid-twentieth century there has been a decrease in snow cover periods across certain parts of Russia. The snow cover period has become particularly shorter in **Western Siberia, Taymyr** and **Yakutia**. In 2020 Siberia experienced an extraordinary heatwave which lasted several months, thawing permafrost and sea ice. The highest ever recorded temperature above the Arctic circle was made in the Russian town of Verkhoyansk, a staggering 38°C.



The biomes of Russia

- Tundra
- Taiga Boreal
- Temperate Forest
- Steppes Prairies
- Desert
- Permafrost
- Shorter snow cover periods*

*Data from the Roshydromet Assessment Report on Climate Change and its Consequences in the Russian Federation.

CASE STUDY

Arctic tundra biome

The Nenets reindeer herders cover vast distances as part of an annual cycle as they move with their reindeer herds from the winter pastures of the forest tundra northwards towards the summer pastures adjacent to the Barents and Kara Seas.

The warming climate in the Arctic region presents the Nenets with a range of pressures linked to this seasonal migration. In particular, the thawing and gradual degradation of permafrost impedes the progress of both the Nenets and their herds as they move across the region with the surface layer becoming unstable and difficult to traverse. The migratory movement is further impeded by the ongoing development of hydrocarbon resources on the Yamal Peninsula which ensures the region is criss-crossed with new transport routes and pipelines.



Reindeer herder's wife and Nenets reindeer, Yamal, Russia

CASE STUDY

Taiga biome

The warming climate in Russia's northern territory is encouraging a number of trends which have the potential to alter the character and extent of the region's immense boreal forest. Most notably, forest fires now strike with greater regularity: increasing tree mortality and decreasing carbon sequestration in the biosphere. Rising average temperatures also facilitate other natural disturbances such as the northward movement of pests and disease.

Changes in the thaw rate (borehole comparison)

The **Tiksi Stone Ridge borehole** 20m deep in the Russian Arctic tundra (latitude 71.587 longitude 128.777) has seen a 0.52°C temperature increase for 2008-2016. This is a dramatic warming of important frozen carbon storage.



The **Umaybyt 20 borehole** 20m deep in the Russian taiga (latitude 61.429 longitude 128.849) has seen a 0.25°C temperature increase for 2008-2016.

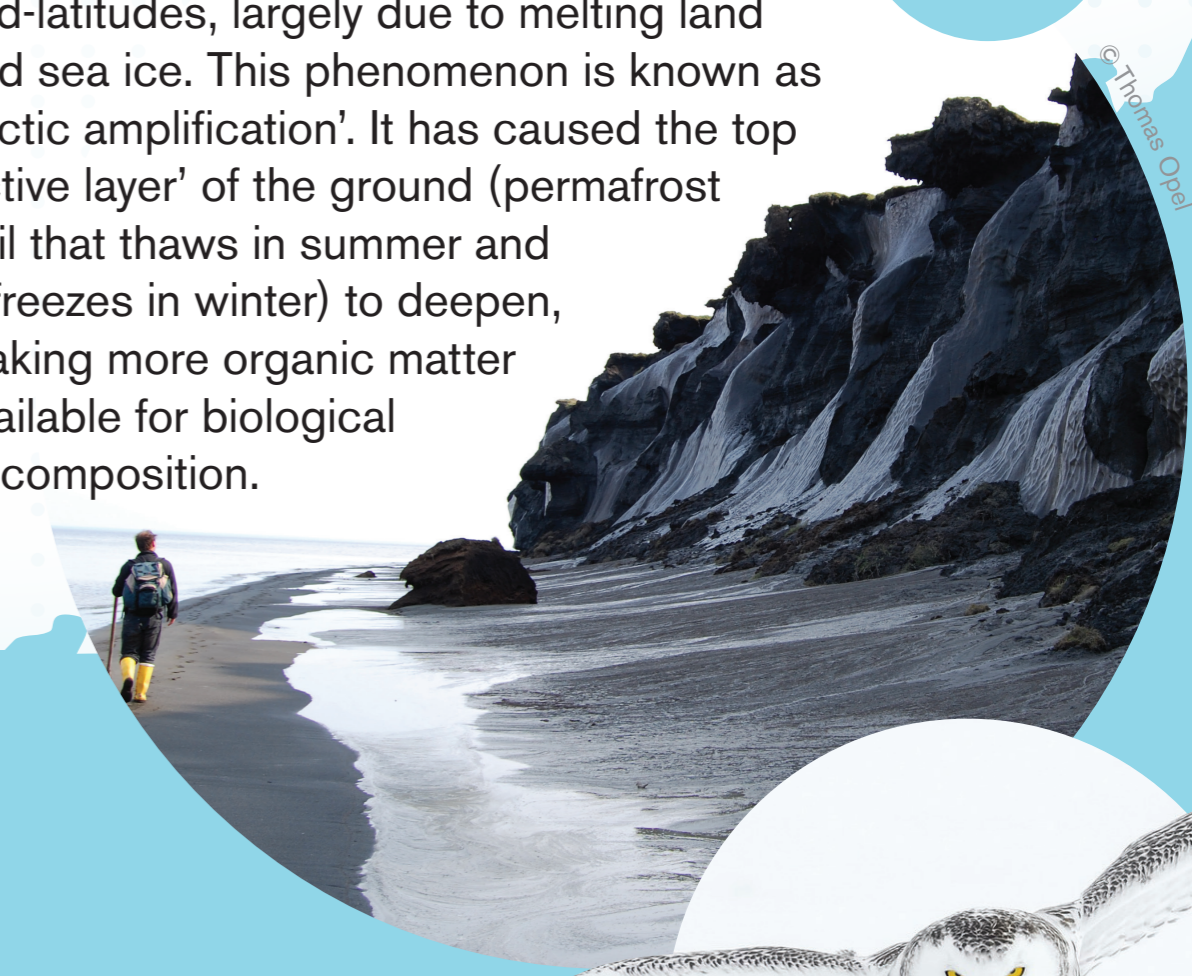


Permafrost

Permafrost formation begins when water is trapped and frozen in soil, sediment and rock pores. After at least two consecutive years if the ground remains below zero degrees, it's called permafrost.

Continuous permafrost is an unbroken sheet of frozen material which extends under all surfaces and remains below zero degrees.

Average global temperatures have warmed by roughly 1°C compared to pre-industrial times. However warming has not been felt equally around the world – it has been particularly extreme in the high latitudes. Arctic temperatures have increased at least twice as fast (current estimates say 2-3 times as fast) when compared to the mid-latitudes, largely due to melting land and sea ice. This phenomenon is known as 'Arctic amplification'. It has caused the top 'active layer' of the ground (permafrost soil that thaws in summer and refreezes in winter) to deepen, making more organic matter available for biological decomposition.



Coastal erosion of permafrost

Flora and fauna of the tundra

- Pasque Flower
- Densely growing arctic moss
- Bearberry



- Northern Russian tundra reindeer
- Brown bear
- Snowy owl

